

What is claimed is:

1. A downhole tool for sealing a void in a subterranean formation comprising:
an inner tubing having at least one port disposed at a bottom end through which a first component of a sealant mixture is delivered downhole;
an outer tubing disposed around the inner tubing thereby forming an annulus therebetween through which a second component of the sealant mixture is delivered downhole, the outer tubing having a closed bottom end, which extends below the bottom end of the inner tubing;
a mixing chamber formed between the bottom end of the inner tubing and the bottom end of the outer tubing into which the first and second components of the sealant mixture combine to form the sealant mixture; and
at least one discharge port formed at the bottom end of the outer tubing for discharging the sealant mixture from the mixing chamber.
2. The downhole tool of claim 1 wherein the at least one port in the inner tubing is defined by an open bottom end.
3. The downhole tool of claim 1 wherein the at least one port in the inner tubing is defined by a plurality of ports disposed around a circumferential surface of the bottom end of the inner tubing.
4. The downhole tool of claim 1 wherein the inner tubing comprises a bull plug at the bottom end of the inner tubing.
5. The downhole tool of claim 1 further comprising a large latch ring for attachment to the outer tubing and a small latch ring attached to the large latch ring.
6. The downhole tool of claim 5 further comprising a rod inserted into the small latch ring, which extends from at least a top end of the downhole tool to a top edge of the at least one discharge port in the outer tubing, wherein the rod orientates the downhole tool in a borehole.
7. The downhole tool of claim 1 further comprising a stop, which is attached inside the outer tubing and is a rest for the bottom end of the inner tubing.
8. The downhole tool of claim 1 wherein the downhole tool further comprises a static mixer in the mixing chamber, which aids in mixing the first component and second component in the mixing chamber.

9. The downhole tool of claim 1 wherein the outer tubing comprises a bull plug at the bottom end of the outer tubing.
10. The downhole tool of claim 1 wherein the first component of the sealant mixture comprises an activator.
11. The downhole tool of claim 1 wherein the first component of the sealant mixture comprises a flowable cement composition.
12. The downhole tool of claim 1 wherein the second component of the sealant mixture comprises a flowable cement composition.
13. The downhole tool of claim 1 wherein the second component of the sealant mixture comprises an activator.
14. The downhole tool of claim 1 wherein the sealant mixture comprises a substantially non-flowable cement composition.

15. A downhole tool for sealing a void in a subterranean formation comprising:
an inner tubing having at least one port disposed at a bottom end through which a first component of a sealant mixture is delivered downhole;

an outer tubing disposed around the inner tubing thereby forming an annulus therebetween through which a second component of the sealant mixture is delivered downhole, the outer tubing having a closed bottom end, which extends below the bottom end of the inner tubing;

a mixing chamber formed between the bottom end of the inner tubing and the bottom end of the outer tubing into which the first and second components of the sealant mixture combine to form the sealant mixture;

at least one discharge port formed at the bottom end of the outer tubing for discharging the sealant mixture from the mixing chamber; and

means for orientating the downhole tool in a borehole.

16. The downhole tool of claim 15 wherein the at least one port in the inner tubing is defined by an open bottom end.

17. The downhole tool of claim 15 wherein the at least one port in the inner tubing is defined by a plurality of ports disposed around a circumferential surface of the bottom end of the inner tubing.

18. The downhole tool of claim 15 wherein the inner tubing comprises a bull plug at the bottom end of the inner tubing.

19. The downhole tool of claim 15 wherein the means for orientating the downhole tool in the borehole comprises a large latch ring attached to the outer tubing, a small latch ring attached to the large latch ring, and a rod inserted into the small latch ring, the rod extending from at least a top end of the downhole tool to a top edge of the at least one discharge port in the outer tubing.

20. The downhole tool of claim 15 further comprising a stop, which is attached inside the outer tubing and is a rest for the bottom end of the inner tubing.

21. The downhole tool of claim 15 wherein the downhole tool further comprises a static mixer in the mixing chamber, which aids in mixing the first component and second component in the mixing chamber.

22. The downhole tool of claim 15 wherein the outer tubing comprises a bull plug at the bottom end of the outer tubing.

23. The downhole tool of claim 15 wherein the first component of the sealant mixture comprises an activator.

24. The downhole tool of claim 15 wherein the first component of the sealant mixture comprises a flowable cement composition.

25. The downhole tool of claim 15 wherein the second component of the sealant mixture comprises a flowable cement composition.

26. The downhole tool of claim 15 wherein the second component of the sealant mixture comprises an activator.

27. The downhole tool of claim 15 wherein the sealant mixture comprises a substantially non-flowable cement composition.

28. A method of sealing a void in a subterranean formation comprising the steps of:
pumping a first component of a sealant mixture through an inner tubing, the inner tubing having at least one port disposed at a bottom end through which the first component is discharged downhole from the inner tubing;

pumping a second component of the sealant mixture through an annulus formed between an outer tubing disposed around the inner tubing, wherein the annulus delivers the second component of the sealant mixture downhole;

combining the first component of the sealant mixture and the second component of the sealant mixture in a mixing chamber formed between the bottom end of the inner tubing and a closed bottom end of the outer tubing, which extends below the bottom end of the inner tubing; and

discharging the sealant mixture from the mixing chamber into the void.

29. The method of claim 28 further comprising the steps of:
mixing a first cementitious component and an aqueous-based fluid in a first mixer to form an intermediate cement composition; and

mixing the intermediate cement composition and a second cementitious component in a second mixer to form the second component of the sealant mixture.

30. The method of claim 28 further comprising the steps of:
mixing a first cementitious component and an aqueous-based fluid in a first mixer to form an intermediate cement composition; and

mixing the intermediate cement composition and a second cementitious component in a second mixer to form the first component of the sealant mixture.

31. A method of sealing a void in a subterranean formation comprising the steps of:
providing a first component of a sealant mixture comprising an activator;
mixing a first cementitious component and an aqueous-based fluid in a first mixer
to form an intermediate cement composition;
mixing the intermediate cement composition and a second cementitious
component in a second mixer to form a second component of the sealant mixture;
pumping the first component of the sealant mixture through an inner tubing, the
inner tubing having at least one port disposed at a bottom end through which the first component
is discharged downhole from the inner tubing;
pumping the second component of the sealant mixture through an annulus formed
between an outer tubing disposed around the inner tubing, wherein the annulus delivers the
second component of the sealant mixture downhole,
combining the first component of the sealant mixture and the second component
of the sealant mixture in a mixing chamber formed between the bottom end of the inner tubing
and a closed bottom end of the outer tubing, which extends below the bottom end of the inner
tubing; and
discharging the sealant mixture from the mixing chamber into the void.
32. The method of claim 31 further comprising the step of monitoring the properties
of the intermediate cement composition.
33. The method of claim 31 further comprising the step of monitoring the properties
of the second component of the sealant mixture.
34. The method of claim 31 wherein the first cementitious component is a fly ash.

35. A method of sealing a void in a subterranean formation comprising the steps of:
mixing a first cementitious component and an aqueous-based fluid in a first mixer to form an intermediate cement composition;
mixing the intermediate cement composition and a second cementitious component in a second mixer to form a first component of a sealant mixture;
pumping the first component of the sealant mixture through an inner tubing, the inner tubing having at least one port disposed at a bottom end through which the first component is discharged downhole from the inner tubing;
pumping a second component of the sealant mixture through an annulus formed between an outer tubing disposed around the inner tubing, wherein the annulus delivers the second component of the sealant mixture downhole,
combining the first component of the sealant mixture and the second component of the sealant mixture in a mixing chamber formed between the bottom end of the inner tubing and a closed bottom end of the outer tubing, which extends below the bottom end of the inner tubing; and
discharging the sealant mixture from the mixing chamber into the void.
36. The method of claim 35 further comprising the step of monitoring the properties of the intermediate cement composition.
37. The method of claim 35 further comprising the step of monitoring the properties of the first component of the sealant mixture.
38. The method of claim 35 wherein the first cementitious component is a fly ash.

39. A method of preparing a cement composition comprising the steps of:
mixing a first cementitious component and an aqueous-based fluid to form an intermediate cement composition in a first mixer; and
mixing the intermediate cement composition and a second cementitious component in a second mixer to form the cement composition.
40. The method of claim 39 further comprising the step of monitoring the properties of the intermediate cement composition.
41. The method of claim 39 further comprising the step of monitoring the properties of the cement composition.
42. The method of claim 39 wherein the first cementitious component is a fly ash.